



Istituto Ambiente Marino Costiero

Gruppo di GeoHazard:

- Hazard costiero
- Fenomeni alluvionali
- Fenomeni franosi
- Hazard sismico

Commissioni internazionali:

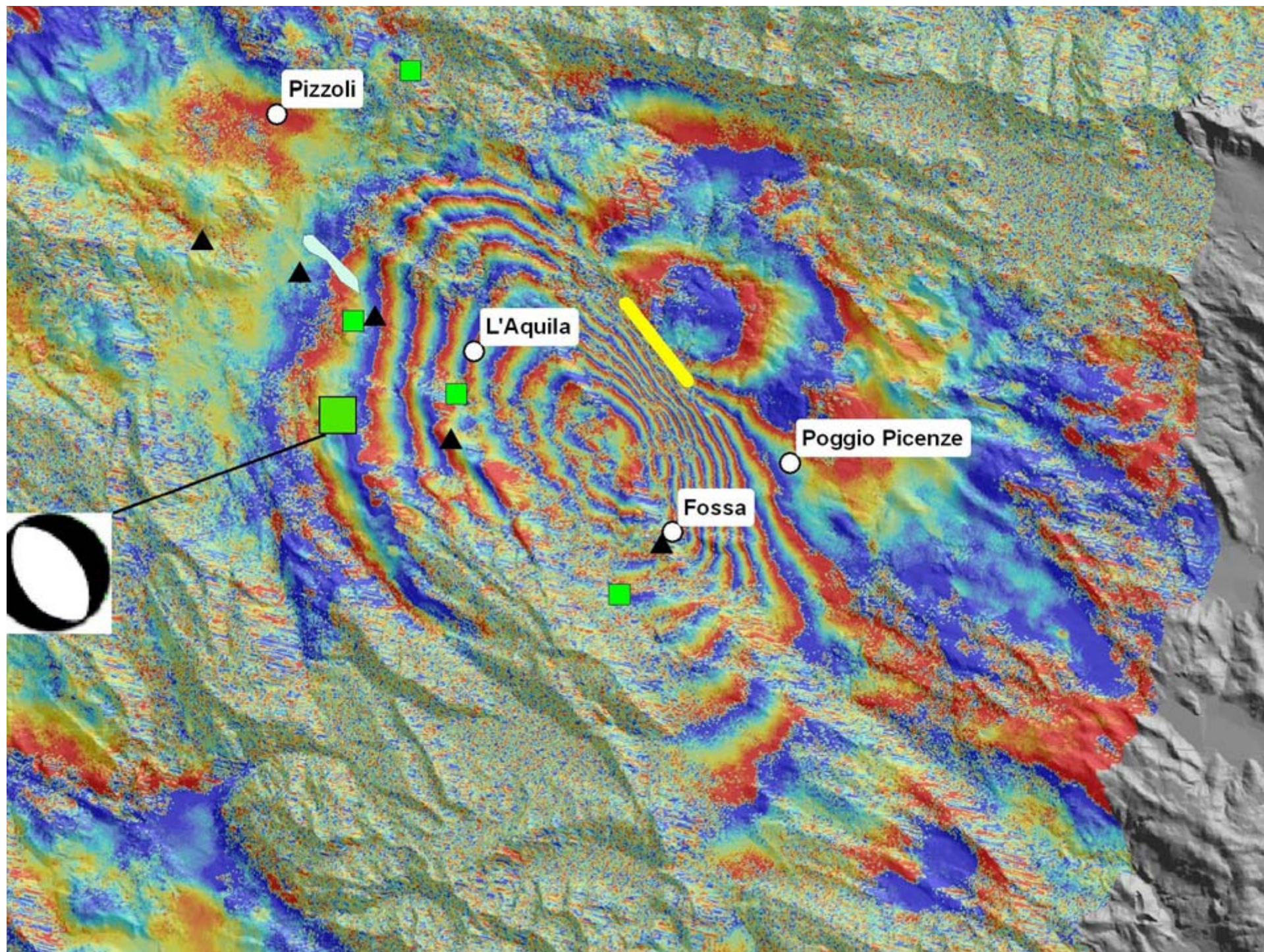
INQUA, EGU, IAEG,
TERPRO, GEOSS



Istituto Ambiente marino Costiero

- **Valutazione Hazard Sismico**
- **Effetti sismoindotti**
- **Intervento a seguito del terremoto in Abruzzo del 6/04/2009**

**E. Esposito, F. Molisso, S. Porfido,
M. Sacchi, Violante C.**





































ESI 2007 Form



This 2 pages - form has to be used for field surveys immediately after the earthquake and for the revision of environmental effects from historical sources. It is designed at the site level (one different form for each different site). Fields in *Italic* should be filled when required information is available.
A complete Guide to Compilation is available at the end of this Form.

Authors & Institution

1. _____
2. _____
3. _____
4. _____
5. _____

Earthquake

Earthquake Code _____ Earthquake Region _____
 Year _____ Month _____ Day _____ Greenwich Time _____ Epicentral Intensity _____ Intensity type _____
 Magnitude _____ Magnitude type _____ Focal Depth (km) _____ Depth accuracy _____
 Latitude _____ Longitude _____ Earthquake References _____
Surface faulting (yes/ no): _____ *Map of rupture zone (available / not available)* _____
Maximum Displacement (cm) _____ *Total Rupture Length (km)* _____ *Slip-sense* _____
Surface faulting References _____
Area of max secondary effects (kms) _____ *Reference for secondary effects* _____

ESI epicentral intensity assessment _____

Locality

Locality Code _____ EEE-Survey Date _____ Surveyors _____
 Locality _____ Town/District _____ Locality length (m) _____ Locality width (m) _____
 Latitude _____ Longitude _____ Altitude (m) _____ Location accuracy _____
 Distance from epicentre (km) _____ Local PGA (g) _____ Geomorphological setting _____
 Local Macroseismic Intensity _____ Intensity type _____

EEE site

EEE Code _____ EEE type _____ Site length (m) _____ Site width (m) _____
 Site position _____ Latitude _____ Longitude _____ Altitude (m) _____ Loc. accuracy _____
 Description _____
 Notes on the site _____
 Bedrock lithology _____ Soft sediment lithology _____
 Strength _____ Structure _____
 EEE Site References _____

Effects on man-made structures

Type of man-made structures _____
 Level of damage _____ Single/multiple _____

Surface faulting

Strike (°) _____ Dip (°) _____ Slip vector (°) _____ Type of movement _____
 Vertical Offset (cm) _____ Horizontal Offset (cm) _____ Displaced features _____
 Length of fault segment (km) _____ Scarp _____ Associated features: _____

Hydrologic anomalies

Surface water effects _____ Ground water effects _____
 Temperature Anomaly ☐ Temperature change (°C) _____ Discharge anomaly ☐ Discharge change (l/s) _____
 Chemical anomaly _____ Change chemical components _____ Gas emission ☐ Gas element _____
 Duration of anomaly (days) _____ Time delay (hrs) _____ Velocity _____

Anomalous waves/tsunami

Max wave height (m) _____ Width (m) _____ Length of affected coast (km) _____ Time delay (min) _____
 Description _____

Ground cracks

Origin _____ Strike (°) _____ Dip (°) _____ Areal density (Nr/m²) _____
 Shape _____ Max opening (cm) _____ Length (m) _____

Slope movements

Type _____ Max dimension of blocks (m³) _____ Total volume (m³) _____
 Linear density (Nr/m) _____ Areal density (Nr/m²) _____ Humidity _____
 Time delay (hrs) _____ Width (m) _____ Slip amount (m) _____

Liquefactions

Type _____ Max diameter (m) _____ Linear density (Nr/m) _____
 Areal density (Nr/m²) _____ Max lowering/uplift (m) _____ Shape _____
 Humidity _____ Depth of water table (m) _____ Water ejection ☐ Sand ejection ☐
 Velocity _____ Time delay/advance (hrs) _____

Other effects

Three shaking ☐ Dust clouds ☐ Jumping stones ☐ Other _____
 Description _____

Sketch

ESI local intensity assessment _____

CHART OF THE INQUA ENVIRONMENTAL SEISMIC INTENSITY SCALE 2007 - ESI 07
by The Spanish Working Group (modified from Silva et al., 2008)

ESI 2007		PRIMARY EFFECTS		SECONDARY EFFECTS WITH GEOLOGICAL AND GEOMORPHOLOGICAL RECORD					OTHER SECONDARY EFFECTS WITH MINOR GEOLOGICAL RECORD		AFFECTED AREA AND TYPE OF RECORD		
		SURFACE RUPTURES	TECTONIC UPLIFT/SUBSID	GROUND CRACKS	SLOPE MOVEMENTS	LIQUEFACTION PROCESSES	ANOMALOUS WAVES AND TSUNAMIS	HYDROGEOLOGICAL ANOMALIES	TREE SHAKING	Affected AREA	Type of RECORD		
OBSERVED DAMAGING DESTRUCTIVE VERY DESTRUCTIVE DEVASTATING	I-III	Offset	Length	Width	Length	ENVIRONMENTAL EFFECTS ARE VERY RARE AND CANNOT BE USED AS DIAGNOSTIC							
	IV	ABSENT	ABSENT	Rare and local	Rare and local	Only devaluated levels (seismites)	cm Temporary sea-level changes dm Waves < 1 m	Temporary level changes Temp. turbidity changes Temporary F+Q changes		Rare and local			
	VII	Rare and local	Permanent ground dislocations (< 10 cm)	mm	10 ³ m ³	50 cm					Local within epicentral zone		
	VIII		< 1 m	cm	10 ⁻¹ -10 ⁻⁵ m ³	1 m	1-2 m	Temp. temperature changes	Temp. spring drying		100 km ²	Geological frequent and exceptionally geomorphological Geological and geomorphological characteristic and frequently geomorphological	
	X		< 10 m	dm	10 ⁻⁵ -10 ⁻⁶ m ³	0.5 m	3-5 m				1,000 km ²		
	XI		> 10 m	metric	> 10 ⁸ m ³	> 5 m	> 10 m		Permanent river changes		5,000 km ²		
	XII		> 100 km	> 100 km	Giant Landslides	Far-field (200-300 km) significant landsliding					10,000 km ²		
										50,000 km ²			
		Dip and strike-slip offset of coseismic ruptures	Permanent ground dislocation	Width and length of cracks and fractures in soils and rocks	Bulk volume of mobilised material	Dimension of liquified levels and sand boils	Transitory sea-level changes, standing waves and Tsunamis	Base-level changes in springs, rivers, aquifers	Tree branches and tree-trunk falling, rupture, etc...				

Michetti et al., 2007. Environmental Seismic Intensity scale - ESI 2007. Memorie Descrittive della Carta Geologica d'Italia, 74. Servizio Geologico d'Italia, APAT, Rome, Italy
Silva et al., 2008. Catalogue of the geological and environmental effects of earthquakes in Spain in the ESI-2007 Macroseismic scale. Cong. Geol. Esp. Gran Canaria, Spain



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Grazie

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<http://www.cnr.it/istituti/FocusByN.html?cds=002&nfocus=8>

http://www.apat.gov.it/site/_files/Inqua/ESI_07_form.pdf